Leaving Patient-Controlled Analgesia Pumps Behind: Renovating Postoperative Pain Management following Spinal Fusions for Adolescent Idiopathic Scoliosis

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INTRODUCTION: Postoperative narcotic use in analgesia protocols is widely recognized as standard practice. However, abuse of narcotics continues to spark discussion for alternative regimens. Standard practice for patients with adolescent idiopathic scoliosis (AIS) undergoing posterior spinal fusion and instrumentation (PSFI) includes the use of a patient-controlled analgesia pump (PCA) for narcotic administration. The goal of this study is to evaluate the efficacy of a non-narcotic multimodal approach, including IV NSAIDs, supplemented by PRN narcotics compared to the traditional PCA method.

METHODS:

AIS patients undergoing PSF by 3 pediatric fellowship-trained orthopaedic surgeons at a single institution from 2016-2020 were included in our study. We evaluated two groups in our study. The PCA group was reviewed retrospectively and included patients who underwent PSF for AIS in 2016-2017. There was a trial period for the new protocol in 2018. The non-PCA group was then performed prospectively and included patients who underwent PSF for AIS in 2019-2020. Pain regimen for our novel protocol is outlined in figure 1. Patients 10-17 years old of both genders with a diagnosis of AIS requiring surgical correction without prior spinal surgery were included in the study. Patients with neuromuscular or congenital scoliosis were excluded from the study. Comparison between the groups included total morphine milligram equivalent per kilogram (MME/kg), length of stay (LOS), and PT (physical therapy) outcomes including days to get out of bed (OOB), and days to reach PT walking goal.

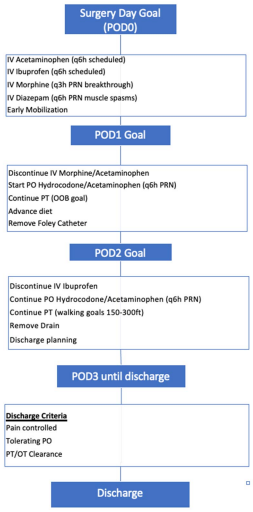
RESULTS:

A total of 100 patients were included in our study. Of these, 50 patients made up the retrospective PCA group while another 50 patients formed the prospective non-PCA group. The mean age at the time of surgery was 14.4 years for the PCA group and 14.0 years for the non-PCA group ($p=0.36$). Each group was composed of 11 males and 39 females ($p=1.0$). There were no significant differences between the groups in terms of weight ($p=0.7$) and BMI ($p=0.53$). Surgeons on average fused 10 vertebral levels for each group ($p=0.81$). The mean preoperative radiographic spine curvature magnitudes for both groups were 56.2 ± 8.2 degrees for the PCA group vs. 59.3 ± 10.0 degrees for the non-PCA group ($p=0.12$). Surgical time was not statistically significant for both groups (273.3 ± 61.9 min PCA Group vs. 259.2 ± 47.1 min non-PCA group, $p=0.21$).

There were statistically significant differences in the total narcotic use between the two groups, length of stay, time to OOB, and time to reach PT goals. The non-PCA group used on average less narcotics, 1.32 MME/kg compared to 2.44 MME/kg in the PCA group, ($p<0.01$). LOS averaged 3.5 days in the non-PCA group and 4 days in the PCA group, ($p<0.01$). Patients in the non-PCA group were more likely to get OOB on postop day 1 than the PCA group (92% vs. 64%, respectively), ($p<0.01$). The non-PCA group also reached PT goals sooner, at 2.5 days, than the PCA group group, at 2.9 days, ($p<0.01$). No patient required conversion to PCA.

DISCUSSION AND CONCLUSION:

An intradisciplinary team approach with multimodal postoperative pain management is paramount to a safe and efficient inpatient course for AIS patients undergoing PSF. Our non-narcotic multimodal approach, including IV NSAIDs, and supplemented by PRN narcotics decreased inpatient narcotic use, length of hospital stay, and time to PT goals when compared to the traditional PCA method while not having a significant difference in complication rate making it an excellent alternative.


Surgery Day Goal (POD0)
IV Acetaminophen (q6h scheduled)
IV Ibuprofen (q6h scheduled)
IV Morphine (q3h PRN breakthrough)
IV Diazepam (q6h PRN muscle spasms)
Early Mobilization
POD1 Goal
Discontinue IV Morphine/Acetaminophen
Start PO Hydrocodone/Acetaminophen (q6h PRN)
Continue PT (OOB goal)
Advance diet
Remove Foley Catheter
POD2 Goal
Discontinue IV Ibuprofen
Continue PO Hydrocodone/Acetaminophen (q6h PRN)
Continue PT (walking goals 150-300ft)
Remove Drain
Discharge planning
POD3 until discharge
Discharge Criteria
Pain controlled
Tolerating PO
PT/OT Clearance
Discharge